Patent Claims

1. A self-oscillating circuit comprising comparator means (CM) comprising at least one input means (IM) and at least one output means (OM),
at least one of said at least one output means (OM) is coupled to at least one of said at least one input means (IM) via at least one filtering means (FM),
said at least one filtering means (FM) at least partly comprising demodulation means (DM),

wherein said filtering means (FM) is of at least fifth order.

2. A self-oscillating circuit according to claim 1, wherein the number of filter poles comprised by the characteristic of said filtering means (FM) is at least five, more preferably at least six and even more preferably at least seven.

3. A self-oscillating circuit according to claim 1, wherein the number of filter poles comprised by the characteristic of said filtering means (FM) is at least eight, more preferably at least nine and even more preferably at least ten.

4. A self-oscillating circuit according to claim 1, wherein the number of filter poles comprised by the characteristic of said filtering means (FM) is at least eleven, more preferably at least twelve and even more preferably at least thirteen.

5. A self-oscillating circuit according to any of the claims 1 to 4, wherein the number of filter zeroes comprised by the characteristic of said filtering means (FM) is at least two, more preferably at least three and even more preferably at least four.

6. A self-oscillating circuit according to any of the claims 1 to 5, wherein the number of filter zeroes comprised by the characteristic of said filtering means (FM) is at least five, more preferably at least six and even more preferably at least seven.

7. A self-oscillating circuit according to any of the claims 1 to 6, wherein the number of filter zeroes comprised by the characteristic of said filtering means FM is at least eight, more preferably at least nine and even more preferably at least ten.

8. A self-oscillating circuit according to any of the claims 1 to 7, wherein the number of filter poles comprised by the characteristic of said filtering means (FM) exceeds the number of filter zeroes by three.

9. A self-oscillating circuit according to any of the claims 1 to 8, wherein at least one of said filter zeroes comprised by the characteristic of said filtering means (FM) cancels at least one of said filter poles.

10. A self-oscillating circuit according to any of the claims 1 to 9, wherein the location of at least one of said filter zeroes is determined on the basis of the location of at least one of said filter poles.

11. A self-oscillating circuit according to any of the claims 1 to 10, wherein the location of each of said filter zeroes is determined on the basis of the locations of said filter poles.

12. A self-oscillating circuit according to any of the claims 1 to 11, wherein said self-oscillating circuit oscillates at a switch frequency (f_{SW}) higher than the upper frequency (f_0) of a utility frequency band.

13. A self-oscillating circuit according to any of the claims 1 to 12, wherein said utility frequency band is the audio band.

14. A self-oscillating circuit according to any of the claims 1 to 13, wherein said utility frequency band comprises frequencies in the range of 0 Hz to 100 kHz.

15. A self-oscillating circuit according to any of the claims 1 to 14, wherein said utility frequency band comprises frequencies in the range of 0 Hz to 60 kHz.

16. A self-oscillating circuit according to any of the claims 1 to 15, wherein said utility frequency band comprises frequencies in the range of 20 Hz to 20 kHz.

17. A self-oscillating circuit according to any of the claims 1 to 16, wherein said self-oscillating circuit comprises a switch mode amplifier (AM).

18. A self-oscillating circuit according to any of the claims 12 to 17, wherein said switch frequency (f_{SW}) is at least partly determined by means of said filter poles and said filter zeroes.

19. A self-oscillating circuit according to any of the claims 12 to 18, wherein the phase margin of the open loop characteristic for frequencies within a frequency band having a lower frequency of one tenth of said switch frequency (f_{SW}) and an upper frequency of said switch frequency (f_{SW}) is between 0° and 60°.

20. A self-oscillating circuit according to any of the claims 12 to 18, wherein the phase margin of the open loop characteristic for frequencies within a frequency band having a lower frequency of one tenth of said switch frequency (f_{SW}) and an upper frequency of said switch frequency (f_{SW}) is between 0° and 45°.

21. A self-oscillating circuit according to any of the claims 12 to 18, wherein the phase margin of the open loop characteristic for frequencies within a frequency band having a lower frequency of one tenth of said switch frequency (f_{SW}) and an upper frequency of said switch frequency (f_{SW}) is between 0° and 30°.

22. A self-oscillating circuit according to any of the claims 12 to 21, wherein the gain of the open loop characteristic at a frequency of one hundredth of said switch frequency (f_{SW}) exceeds the gain at said switch frequency (f_{SW}) by at least 50dB.

23. A self-oscillating circuit according to any of the claims 12 to 21, wherein the gain of the open loop characteristic at a frequency of one hundredth of said switch frequency (f_{SW}) exceeds the gain at said switch frequency (f_{SW}) by at least 60dB.

24. A self-oscillating circuit according to any of the claims 12 to 21, wherein the gain of the open loop characteristic at a frequency of one hundredth of said switch frequency (f_{SW}) exceeds the gain at said switch frequency (f_{SW}) by at least 70dB.

25. A self-oscillating circuit according to any of the claims 1 to 24, wherein the characteristic of said filtering means (FM) comprises additional auxiliary filter poles or zeroes.

26. A self-oscillating circuit according to any of the claims 12 to 25, wherein said upper frequency (f_0) of said utility frequency band is determined as the break frequency of said demodulation means (DM).

27. A self-oscillating circuit according to any of the claims 1 to 26, wherein the characteristic of said demodulation means (DM) comprises at least one filter pole.

28. A self-oscillating circuit according to any of the claims 1 to 27, wherein the characteristic of said demodulation means (DM) comprises at least two filter poles.

29. A self-oscillating circuit according to any of the claims 1 to 28, wherein said filtering means (FM) comprises at least one feedback filtering means (FFM) and at least one compensation filtering means (CFM).

30. A self-oscillating circuit according to any of the claims 1 to 29, wherein said self-oscillating circuit comprises at least two feedback paths.

31. A self-oscillating circuit according to any of the claims 1 to 30, wherein said self-oscillating circuit comprises a first feedback path comprising at least partly said demodulation means (DM), a first feedback filtering means (FFFM) and a first

compensation filtering means (FCFM) and an additional feedback path comprising an additional feedback filtering means (AFFM) and an additional compensation filtering means (ACFM).

32. A self-oscillating circuit according to claim 31, wherein said additional feedback path at least partly comprises said demodulation means (DM).

33. A self-oscillating circuit according to any of the claims 1 to 32, wherein said comparator means (CM) comprises a hysteresis comparator.

34. A self-oscillating circuit according to any of the claims 17 to 33, wherein said switch mode amplifier (AM) comprises two switches.

35. A self-oscillating circuit according to any of the claims 17 to 34, wherein said switch mode amplifier (AM) is a power amplifier.

36. A self-oscillating circuit according to any of the claims 17 to 35, wherein said switch mode amplifier (AM) comprises MOSFET transistors.

37. A self-oscillating circuit according to any of the claims 1 to 36, wherein said demodulation means (DM) is a low-pass filter.

38. A self-oscillating circuit according to any of the claims 1 to 37, wherein said demodulation means (DM) comprises auxiliary circuitry.

39. A self-oscillating circuit according to claim 38, wherein said auxiliary circuitry comprises means for protecting said self-oscillating circuit.

40. A self-oscillating circuit according to claim 38 or 40, wherein said auxiliary circuitry comprises a Zöbel network.

41. A self-oscillating circuit according to any of the claims 38 to 40, wherein said auxiliary circuitry comprises means for impedance matching.

42. A self-oscillating circuit according to any of the claims 12 to 41, wherein said switch frequency (f_{SW}) is comprised by the frequency band from 100kHz to 100MHz, more preferably the frequency band from 300kHz to 1MHz.

43. A self-oscillating circuit according to any of the claims 31 to 42, wherein said first feedback filtering means (FFFM) is a high-pass filter.

44. A self-oscillating circuit according to any of the claims 31 to 43, wherein said first feedback filtering means (FFFM) comprises a zero at the upper frequency (f_0) of the utility frequency band.

45. A self-oscillating circuit according to any of the claims 31 to 44, wherein said first compensation filtering means (FCFM) is a phase-lag filter.

46. A self-oscillating circuit according to any of the claims 31 to 45, wherein said first compensation filtering means (FCFM) comprises a pole at a low frequency (f_{DC}), a zero at the upper frequency (f0) of the utility frequency band and a pole at the switch frequency (f_{SW}).

47. A self-oscillating circuit according to any of the claims 31 to 46, wherein said additional feedback filtering means (AFFM) is a low-pass filter.

48. A self-oscillating circuit according to any of the claims 31 to 47, wherein said additional feedback filtering means (AFFM) comprises a pole at the upper frequency (f_0) of the utility frequency band.

49. A self-oscillating circuit according to any of the claims 31 to 48, wherein said additional compensation filtering means (ACFM) is a phase-lag filter.

50. A self-oscillating circuit according to any of the claims 31 to 49, wherein said additional compensation filtering means (ACFM) comprises a pole at a low frequency (f_{DC}), a zero at the upper frequency (f0) of the utility frequency band and a pole at the switch frequency (f_{SW}).

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51. A self-oscillating circuit according to any of the claims 17 to 50, wherein said switch mode amplifier (AM) is of a differential output type.